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Imaging of Near to Back Scattered Light in Gas Target Plasmas*

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We have measured light near the laser wavelength (351 nm $\pm$ 5 nm) scattered both into the laser focusing lens (back scattered) and just outside the lens (near to back scattered) by intense f/4.3 and f/8 probe beams in gas filled target plasmas. Although the gain for Brillouin scattering is greatest for back scatter, substantial near to back scattered light can be expected both in experiments with strongly filamenting plasmas, where the scattering region can be smaller than the diffraction limited spot size, and in experiments with strongly inhomogeneous plasmas, where the scattering ion wave have a preferential direction for growth. Two absolutely calibrated, time integrated, cameras image the light scattered 1) through the lens onto a diffuser plate[1] and 2) on to a plate lying between 7.8° and 18.5° outside the f/ 4.3 lens. A single image is constructed using the measurements of both cameras which indicates the energy flux over nearly all of the region inside of 18.5°. Arrays of 10 fiber optic pick offs and 12 photo-diodes provide time resolution of the energy flux and independent measurements of the time integrated energy density at various locations inside 18.5°. In experiments with f/4.3 beams in symmetric plasmas ('gas bags') we find that a substantial energy is scattered outside the lens ($\leq$ that scattered in the lens) and that scattering is symmetric about the beam. In experiments with gas filled hohlraums, in which the laser enters the plasma at 50° w.r.t. the plasma gradient, a larger fraction of the back scattered light is outside the lens ($\leq$ 3x that scattered in the lens) and it is peaked in the direction away from the direction of the plasma gradients. Recently, the diagnostics have been upgraded to measure long wavelength (SRS) light as well. Results will be discussed from experiments have been carried out with f/8 beams, in which intensity, smoothing technique (4-color, or SSD), and target geometry are varied.

[1]D. S. Montgomery et. al. this conference

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Prefer Poster Session